

CLAIM AMENDMENTS

Claims pending:

- At time of the Office Action: Claims 1-36.
- After this Response: Claims 1, 4-12, 16-28, 33 and 35-36.

Canceled claims: 2, 3, 13-15, 29-32 and 34, without prejudice.

Amended claims: 1, 4, 11, 12, 16, 18, 21 and 33.

New Claims: None.

The listing of claims below will replace prior versions of claims in the application:

1. (Currently Amended) A method comprising:

identifying an abrupt transition in average light intensity between two frames, wherein identifying an abrupt transition comprises:

calculating a difference in light intensity histograms between the current frame and a preceding frame; and

comparing the histogram difference to a dynamically determined threshold, wherein an abrupt transition is indicated if the histogram difference exceeds the threshold, and wherein dynamically determining the threshold comprises:

calculating an average and standard deviation value of the histogram difference in a sliding window of frames;

generating one or more thresholds as multiples of the calculated average; and

determining whether the calculated standard deviation falls below a standard deviation threshold before adopting the generated one or more thresholds; and

determining whether the abrupt transition was caused by a shot boundary between the two frames or by a flashlight event.

2 - 3. Canceled.

4. (Currently Amended) A method according to claim 1 [[3]], wherein generating one or more thresholds comprises:

calculating a high threshold that is four- to five-times the calculated average; and

calculating a low average that is two- to three-times the calculated average.

5. (Original) A method according to claim 4, wherein the high threshold is used to determine whether an abrupt transition has occurred.

6. (Original) A method according to claim 4, wherein the low threshold is used to indicate whether a gradual transition has occurred, if the histogram difference does not exceed the high threshold.

7. (Original) A method according to claim 6, further comprising:
comparing the histogram difference to the low threshold;
accumulating the histogram difference of two or more frames if the
histogram difference exceeds the low threshold; and
determining that a gradual transition has occurred if the accumulated
histogram difference exceeds the high threshold.

8. (Original) A method according to claim 1, wherein determining a cause
of the abrupt transition comprises:

calculating a difference in average minimal intensity values between a
window of frames preceding the current frame and a window of frames subsequent
to the current frame;

generating a ratio of the average intensity change of the current frame to the
calculated difference in average minimal intensity values; and

concluding that the abrupt transition is caused by a flashlight event if the
ratio does not exceed a threshold.

9. (Original) A method according to claim 8, wherein calculating a
difference in average minimal intensity values comprises:

identifying a window of frames on either side of the current frame;

generating an average minimal intensity value for each window from a first
and second minimal intensity value of each frame, respectively; and

calculating the difference between the generated average minimal intensity
values.

10. (Original) A method according to claim 8, wherein the threshold is equal to one (1), wherein a ratio that deviates from one indicates that the abrupt transition is due to a shot cut, while a ratio close to one indicates that the abrupt transition is due to a flashlight event.

11. (Currently Amended) A computer readable storage medium comprising storing a plurality of executable instructions which, when executed, implement a method according to claim 1.

12. (Currently Amended) A media analysis agent comprising:

a shot boundary detector to statistically analyze one or more attributes associated with content in video frames to detect abrupt and gradual transitions in the video content indicative of a shot boundary; and

a flashlight detector, responsive to the shot boundary detector, to distinguish abrupt transitions in the video content caused by flashlight events from those caused by actual shot boundaries, to reduce false-positive identification of flashlight events as shot boundaries; and

an adaptive threshold selection module, responsive to the shot boundary detector, to dynamically set one or more thresholds for use in shot boundary identification based, at least in part, on one or more attributes of video content, wherein the adaptive threshold selection module calculates an average and standard deviation of a histogram difference in a sliding window of frames surrounding the current frame, and generates a proposed low threshold value (Ts)

and a proposed high threshold value (T_b) from the average histogram difference, and wherein the proposed low threshold is two- to three-times the calculated average histogram difference, while the proposed high threshold is four- to five-times the calculated average histogram difference.

13 - 15. Canceled.

16. (Currently Amended) A media analysis agent according to claim 12 [[14]], wherein the adaptive threshold selection module certifies the proposed thresholds if the calculated standard deviation does not reach a standard deviation threshold.

17. (Original) A media analysis agent according to claim 16, wherein if the adaptive threshold selection module cannot certify the proposed thresholds, prior thresholds are used by shot boundary detector.

18. (Currently Amended) A media analysis agent according to claim 12 [[14]], wherein the high threshold is used to identify an abrupt transition, while the low threshold is used to indicate a potential gradual transition.

19. (Original) A media analysis agent according to claim 18, wherein shot boundary detector compares the histogram difference to a low threshold if the difference does not exceed the high threshold, and accumulates the histogram differences of frames wherein the difference exceeds the low threshold.

20. (Original) A media analysis agent according to claim 19, wherein shot boundary detector identifies a gradual transition when the accumulated histogram differences exceed the high threshold.

21. (Currently Amended) A media analysis agent according to claim 12 [[13]], wherein the shot boundary detector calculates a difference in light intensity histograms between a current frame and a preceding frame, and compares the histogram difference to a dynamically determined threshold, wherein an abrupt transition is identified by a histogram difference that exceeds the threshold.

22. (Original) A media analysis agent according to claim 21, wherein shot boundary detector invokes an instance of flashlight detector to determine whether the abrupt transition is the result of a flashlight event.

23. (Original) A media analysis agent according to claim 12, wherein flashlight detector calculates a difference in average minimal intensity values between a first sliding window preceding the current frame, and a second sliding window subsequent to the current frame.

24. (Original) A media analysis agent according to claim 23, wherein flashlight detector calculates the average intensity change of the current frame, and generates a ratio of the difference in average minimal intensity values to the average intensity change of the current frame.

25. (Original) A media analysis agent according to claim 24, wherein flashlight detector determines that the abrupt change was due to a flashlight event if the ratio does not exceed a threshold value.

26. (Original) A media analysis agent according to claim 25, wherein the threshold value is one (1).

27. (Original) A media analysis agent according to claim 25, wherein the flashlight detector concludes that the abrupt transition was caused by a shot boundary if the ratio exceeds the threshold value.

28. (Original) A computing system comprising:

a memory, to receive media content; and

a media processing system, coupled to the memory device, including a media analysis agent according to claim 12 to segment the received media content into uniquely identifiable shots.

29 - 32. Canceled.

33. (Currently Amended) One or more computer-readable media having stored thereon a computer program that, when executed by one or more processors, causes the one or more processors to:

calculate a difference in light intensity histograms between two frames;

compare the histogram difference to a dynamically determined threshold, wherein an abrupt transition is indicated if the histogram difference exceeds the threshold, wherein to determine the dynamic threshold, the one or more processors:

calculate an average and standard deviation value of the histogram difference in a sliding window of frames;

generate one or more thresholds as multiples of the calculated average; and

determine whether the calculated standard deviation falls below a standard deviation threshold before adopting the generated one or more thresholds; and

determine whether the abrupt transition was caused by a shot boundary between the two frames or by a flashlight event.

34. Canceled.

35. (Original) One or more computer-readable media as recited in claim 33 wherein to determine a cause of the abrupt transition, the one or more processors:

calculate a difference in average minimal intensity values between a window of frames preceding the current frame and a window of frames subsequent to the current frame;

generate a ratio of the average intensity change of the current frame to the calculated difference in average minimal intensity values; and

conclude that the abrupt transition is caused by a flashlight event if the ratio does not exceed a threshold.

36. (Original) One or more computer-readable media as recited in claim 35 wherein the threshold is equal to one, wherein a ration that deviates from one indicates that the abrupt transition is due to a shot cut, while a ratio close to one indicates that the abrupt transition is due to a flashlight event.